Investigation of Carbon Monoxide Poisonings after Two Major Hurricanes— Alabama and Texas, 2005

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Background:

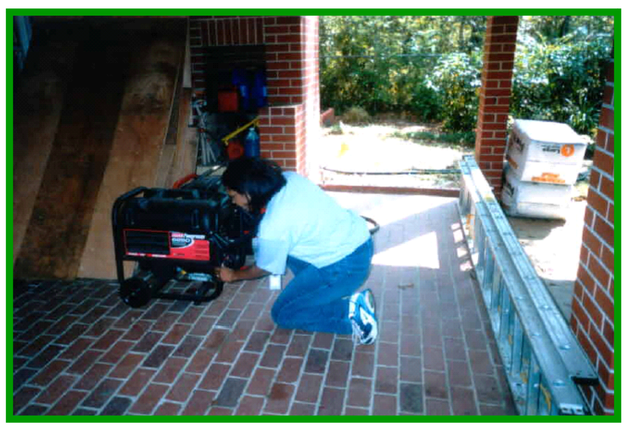
Hurricanes Katrina and Rita struck the Gulf Coast on August 29 and September 24, 2005 respectively. The storms together caused over 100 billion dollars in damages and over 1300 people lost their lives. Despite public health warnings following the storms, surveillance reports from Alabama and Texas indicated numerous carbon monoxide (CO) poisonings due to use of portable generators for electricity. We investigated these poisonings to determine the extent of the problem and to develop prevention strategies.

Damage from Hurricane Katrina, Mobile AL

Damage from Hurricane Rita, Beaumont TX

Methods:

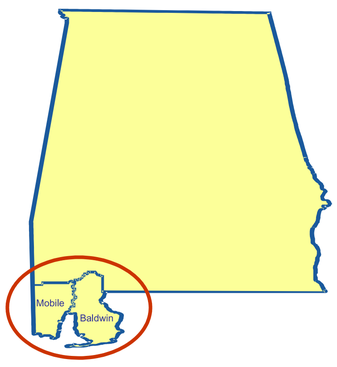
Both investigations in Alabama and Texas were case series studies. A case was defined as an illness among persons of any age residing in affected counties in Alabama or Texas with a clinical diagnosis of CO poisoning. Confirmed cases had an elevated blood carboxyhemoglobin level (> 2% in nonsmokers and >9% in smokers) in addition to a clinical diagnosis. Probable cases had a clinical diagnosis of CO poisoning without laboratory confirmation. We reviewed records from 30 area hospitals for demographic and clinical information. One adult from each poisoned household was asked to participate in a home interview and generator inspection. Fatal cases were not interviewed, but demographic and generator-location information was obtained from investigations conducted by the Consumer Product Safety Commission (CPSC).



CDC investigator conducting a generator inspection

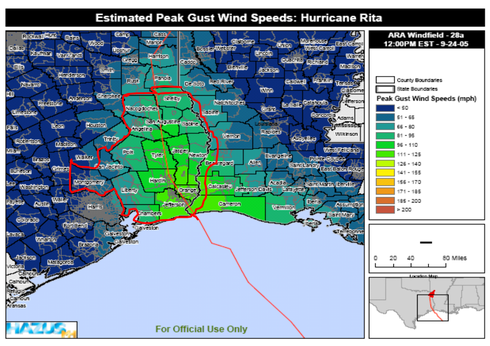
Eighteen counties were included in the investigation

Alabama Counties



In Alabama, we included the two counties most damaged by Hurricane Katrina.

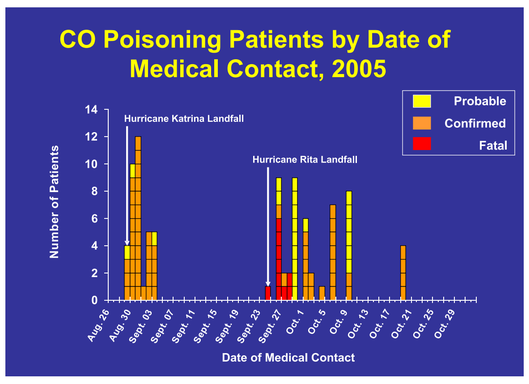
Texas Counties



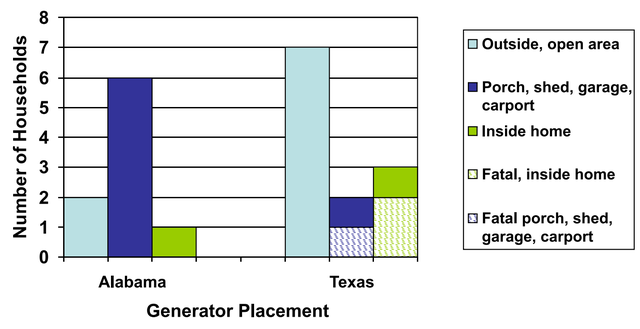
In Texas, Hurricane Rita affected a much wider area, so peak wind gust data was used to estimate power outages, and thus potential generator use. Counties were included if they had peak wind gusts greater than 80 miles per hour or at least one media-reported CO poisoning fatality.

Results:

- We identified 88 CO poisoning cases (including 10 fatalities) that occurred in 27 separate events.
- Portable generators were implicated in 22 of the 23 nonfatal events and three of the four fatal events. The other two incidents involved a fixed generator and a portable gas stove.
- Thirteen (72%) of the 18 interviewed households heard CO prevention messages before the poisoning event.
- Of the 18 households interviewed, 16 (89%) households operated their generators outside (median distance = 4 ft.; range, 1-21 ft.).
- All households with generator-related fatal CO poisonings placed their generator inside the home or an enclosed outdoor area.
- Nine (50%) households were poisoned in homes with operating window air conditioners.
- Six (33%) out of 18 households owned a CO detector prior to the exposure but only one of those detectors functioned properly. Four detectors did not alarm due to dead batteries and one detector alarmed remotely to a security system that was unable to alert the family.



This graph shows the epi-curve of the 88 carbon monoxide poisoning cases. All cases from August 29-September 3 occurred in Alabama, and all cases from September 24-October 19 occurred in Texas.



This graph illustrates where households placed their generators during the poisoning events.

Conclusions:

- Many households were poisoned by exposure to CO from generators after hurricanes in Texas and Alabama despite receiving prevention messages.
- Recommendations for reducing future CO poisonings should emphasize locating generators far from homes without compromising the safety of neighbors.
- Generators should be located away from windows, doors and window air conditioners.
- Households operating a generator should install a battery-operated CO detector and check those batteries twice yearly.

CDC Prevention Efforts:

- This investigation is part of an overall strategy by CDC to decrease CO exposures from portable generators.
- Other current efforts include:
  - Modeling study to determine amounts of CO produced by generators in a variety of generator.
  - Expanding current partnerships with retailers to distribute prevention materials at point of sale and co-marketing generators with other products that facilitate safer generator use, such as CO detectors, long extension cords, and locks and chains to prevent theft.

Partnerships:

The CDC has partnered with the Underwriter's Laboratory and Consumer Product Safety Commission to encourage changes in generator design, such as weatherization of generators, improved warning labels, and generator modifications to decrease the amount of CO in exhaust.

Acknowledgements

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